

Claims

1. Cryogenic transfer system (1) comprising:
 - a cryogenic fluid storage and/or processing structure (2),
 - an off shore loading and/or offloading structure (3,30, 40) comprising a base (18,41) and a reel means (17) rotatable relative to said base around an axis (10),
 - a transfer duct (13,14) extending from the fluid storage and/or processing structure (2) to the loading and/or offloading structure (3,30,40),
 - a flexible hose (12) windable around the reel means (17), connectable with a first end (20) to the duct (13,14), and with a second end (23) connectable to a floating structure (6),characterised in that:

The transfer duct comprises a first and a second duct (13,14), each duct having an end part (22,22') at or near the loading and/or offloading structure (3,30,40), the flexible hose (12) being with the first end (20) connectable to the end part (22) of at least the first or the second duct,

In a cooling configuration, the flexible hose (12) being wound on the reel means (17), the reel means being situated above water level (24) and rotatable around a vertical axis (10), an interconnecting duct section (12,16) extending between the end parts (22,22') of the first and second ducts (13,14),

In a transfer configuration the flexible hose (12) being at least partly unwound from the reel means (17) and being with a second end (23) connectable to the floating structure (6),

25 The loading and/or offloading structure (3,30,40) comprising lifting means (36,43,58,59) for lowering the flexible hose (12) towards water level (24) in the transfer configuration and for raising the hose (12) away from water level for placing the flexible hose in the cooling configuration.

30 2. Cryogenic transfer system (1) according to claim 1, the lifting means comprising the buoy being raisable or lowerable with respect to water level.

3. Cryogenic transfer system (1) according to claim 1 or 2, the interconnecting duct section comprising the flexible hose (12).
4. Cryogenic transfer system (1) according to claim 3, the end part (22') of one of 5 the ducts (14) being releasably coupled to the flexible hose (12).
5. Cryogenic transfer system (1) according to claim 4, the end part (22') being provided with an end closing device (26).
- 10 6. Cryogenic transfer system (1) according to claim 1, 2, 3, 4 or 5, the end parts (22,22') of the ducts (13,14) being interconnected via a branching duct section (16).
- 15 7. Cryogenic transfer system (1) according to any of the preceding claims, the loading and/or offloading structure (3,30) comprising a ballastable buoy, the base (18) being moored to the sea bed (5).
8. Cryogenic transfer system according to any of claims 1 to 6, the base comprising a column (41) resting on the sea bed (5).
- 20 9. Cryogenic transfer system (1) according to any of the preceding claims, the transfer structure comprising a drive means for rotation of the reel around its vertical axis.
10. Cryogenic transfer system (1) according to any of the preceding claims, the reel means (17) having a diameter of at least 10 m.
- 25 11. Cryogenic transfer system (1) according to any of the preceding claims, the transfer duct (13,14) comprising a rigid pipe.
12. Method of transferring a cryogenic fluid from a storage and/or processing 30 structure to an off shore loading and/or offloading structure, the loading and/or offloading structure comprising a base and a reel means rotatable relative to said base around a vertical axis, a transfer duct extending from the fluid storage and/or processing structure to the loading and/or offloading structure, a flexible hose windable

around the reel means, connectable with a first end to the duct, and with a second end connectable to a tanker vessel, the method comprising the steps of:

- in a cooling stage, placing the reel above water level, winding the hose around the reel means and providing cooling fluid from the storage and/or processing structure through the transfer duct towards the loading and/or offloading structure, and

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in a transfer stage:

- lowering the reel towards water level,
- unwinding the flexible hose at least partly from the reel,
- 10 - connecting the second end of the flexible hose to a floating structure, and
- supplying cryogenic fluid from the first structure to the floating structure or vice versa.